11:00

laPA9. Reciprocity and representation theorems for one-way wave fields in fluids and solids. C. P. A. Wapenaar (Lab. of Seismics and Acoust., Delft Univ. of Technol., P.O. Box 5046, 2600 GA Delft, The Netherlands)

An acoustical reflection experiment is intuitively based on (i) downward wave propagation from the acquisition surface into the medium, (ii) reflection by inhomogeneities inside the medium, and (iii) upward propagation of the reflected waves to the acquisition surface. The acoustic and elastodynamic wave equations do not explicitly account for this intuitive distinction between downward and upward propagation. These wave equations govern the total wave field, which may be seen as a superposition of downward propagating and upward propagating wave fields. For this reason these equations are referred to as the two-way wave equations and their solutions are called two-way wavefields. Analogously, the equations that explicitly govern downward and upward propagation are referred to as the one-way wave equations and their solutions are called one-way wavefields. In this paper reciprocity and representation theorems are developed for one-way wave fields. These theorems are the basis for a systematic discussion of acoustic reflection imaging in inhomogeneous fluids and in inhomogeneous anisotropic solids.